AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness, comprising:

using titanium alkoxide $Ti(OR)_4$ as a main component;

combining with chelating agents, Eu or rare earth metal salt, and aqueous solution to form TiO_2-SCA gel;

peptizing the TiO_2-SCA gel by adjusting the pH value thereof;

forming crystalline TiO_2 particles with the TiO_2 gel via a hydrothermal process to form the semiconductor nano-crystalline anatase TiO2 sol;

dip coating said semiconductor nano-crystalline anatase TiO_2 sol on a surface of a fluorescent lamp tube; and

baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol, to form a photocatalytic coated fluorescent lamp capable of cleaning air;

wherein said baking step is carried out at a low temperature in a range of about 100-200°C ~~250~~°; and

wherein, when said photocatalytic coated fluorescent lamp is turned on, the brightness of said photocatalytic coated fluorescent lamp is greater than a lamp not provided with said semiconductor anatase TiO_2 sol coating, due to both a fluorescent property of said semiconductor anatase TiO_2 sol coating and the anatase TiO_2 coating having an ability to photocatalyze visible light, whereby a small amount of UV light (UVA) and blue light from the fluorescent lamp is

absorbed by said anatase TiO_2 coating, thus generating active species such as electron-hole pairs which are capable of cleaning the air.

2. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the step of preparing semiconductor nano-crystalline anatase TiO_2 sol using said chelating agents in aqueous solution comprises:

using an acid process to prepare anatase TiO_2 sol; and

adding H_4TiO_4 solution to an H_4TiO_4/TiO_2 ratio of about 0-10 wt %, thereby improving thickness, adhesion, and hardness of said semiconductor nano-crystalline anatase TiO_2 sol coating.

3. (Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the step of peptizing said ~~TiO_2~~ <u>TiO_2-SCA</u> gel by adjusting the PH value of the TiO_2-SCA gel comprises:

using an alkaline process to prepare anatase TiO_2 sol and adjusting the pH to greater than 7.0.

4. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the step of preparing semiconductor nano-crystalline anatase TiO_2 sol using said chelating agents in aqueous solution comprises:

using the process to prepare anatase TiO_2 sol; and

adding a water solution of precious metal salts or transition metal salt to the anatase TiO_2 sol to obtain an M^+n/anatase TiO_2 ratio of about 0-1.0 wt %, thereby improving visible light photocatalytic ability for air cleaning.

5. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the step of preparing semiconductor nano-crystalline anatase TiO_2 sol using said chelating agents in aqueous solution comprises:

mixing Eu or rare earth metal salt solution to the process to prepare anatase TiO_2 sol to obtain an Eu^+3 or rare earth metal ions/anatase TiO_2 ratio of about 0-1.0 wt %, and

using the process to prepare Eu or rare earth metal doped anatase TiO_2 sol, thereby improving brightness of the fluorescent lamp coated with the anatase TiO_2 sol.

6. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the step of dip coating said semiconductor nano-crystalline anatase TiO_2 sol on the surface of said fluorescent lamp tube further comprises:

dipping a coating frame arranged with an array of fluorescent lamp tubes into said semiconductor nano-crystalline anatase TiO_2 sol by using a coating machine; and

dip coating said lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed is variable based on the desired thickness of coating and concentration of said anatase TiO_2 sol;

wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness, further comprises:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of 150-250°C for 10-30 minutes, and accurate conditions depend on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO2 coating, and manufacture throughput.

7. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the step of dip coating said semiconductor nano-crystalline anatase TiO_2 sol on surface of said fluorescent lamp tube further comprises:

dipping a coating frame arranged with an array of fluorescent lamp tubes into SiO_2 sol or H_4TiO_4 solution by using a coating machine;

dip coating said fluorescent lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said SiO_2 sol or H_4TiO_4 solution;

baking said fluorescent lamp tubes dipped with SiO_2 sol or H_4TiO_4 solution at a temperature of about 50-100°C for about 10-30 minutes, wherein the advanced SiO_2 sol or H_4TiO_4 solution dipping improves optical properties, adhesion, and hardness of said semiconductor nano-crystalline anatase TiO_2 sol coating;

dip coating said lamp tubes in said anatase TiO_2 sol; and

readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said anatase TiO_2 sol;

wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness further comprises:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of about 150-250°C for about 10-30 minutes, and accurate condition depends on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO_2 coating, and designed manufacture throughput.

8. (Previously Presented) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein said fluorescent lamp is selected from the group consisting of normal fluorescent lamps, RGB three wave fluorescent lamps, and high frequency fluorescent lamps.

9. (Previously Presented) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein said fluorescent lamp is selected from the group consisting of a straight tube, an annular tube, a U-

shaped tube, a spiral tube, and a special dual-layer tube, and wherein said dip coating step for fixing said lamp includes a dual head fixing method and a single end fixing method.

10. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein, before dip coating said semiconductor nano-crystalline anatase TiO_2 sol on the surface of a fluorescent lamp tube, wherein the method further comprises:

arranging said fluorescent lamp tube on a coating frame;

washing said fluorescent lamp tube and said coating frame; and

drying said fluorescent lamp tube and said coating frame.

11. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increase brightness as claimed in claim 9, wherein said straight tube dual head fluorescent lamp uses said dual head fixing method wherein, before arranging said fluorescent lamp tubes on said coating frame, the method further comprises:

masking a metal portion at both ends of each of said straight tube dual head fluorescent lamps using protection sleeves or thermal plastic sleeves; and

arranging said straight tube dual head fluorescent lamps through holes on said coating frame and fixing both ends of each of said dual head fluorescent lamps by means of a clipping mechanism disposed at an upper plate and lower plate of said coating frame, so that about 1-100 fluorescent lamps can be arranged on said coating frame.

12. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 11, wherein a method of washing said fluorescent lamp tube and said coating frame comprises dipping said fluorescent lamp tube and said coating frame into solution containing surfactants for removing oil, followed by rinsing in de-ionized water to remove said surfactants.

13. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 12, wherein said method for drying said fluorescent lamp tube and said coating frame comprises placing said fluorescent lamp tube and said coating frame into a drying apparatus, and drying said fluorescent lamp tube and said coating frame with heated air.

14. (Cancelled)

15. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 13, wherein said dried fluorescent lamp tube and said coating frame are subjected to an anatase TiO_2 sol dip coating step which comprises:

dipping a coating frame arranged with an array of fluorescent lamp tubes into said semiconductor nano-crystalline anatase TiO_2 sol by using a coating machine; and

dip coating said lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed is variable based on the desired thickness of coating and concentration of said anatase TiO_2 sol;

wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness, further comprises:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of 150-250°C for 10-30 minutes, and accurate conditions depend on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO2 coating, and manufacture throughput.

16. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increase brightness as claimed in claim 15, wherein said dried fluorescent lamp tube and said coating frame are subjected to a dip coating step, after SiO_2 sol or H_4TiO_4 solution dip coating is performed, followed by anatase TiO_2 sol dip coating, wherein the dip coating step comprises:

dipping a coating frame arranged with an array of fluorescent lamp tubes into SiO_2 sol or H_4TiO_4 solution by using a coating machine;

dip coating said fluorescent lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said SiO_2 sol or H_4TiO_4 solution;

baking said fluorescent lamp tubes dipped with SiO_2 sol or H_4TiO_4 solution at a temperature of about 50-100°C for about 10-30 minutes, wherein the advanced SiO_2 sol or

H_4TiO_4 solution dipping improves optical properties, adhesion, and hardness of said semiconductor nano-crystalline anatase TiO_2 sol coating;

dip coating said lamp tubes in said anatase TiO_2 sol; and

readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said anatase TiO_2 sol;

wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness further comprises:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of about 150-250°C for about 10-30 minutes, and accurate condition depends on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO_2 coating, and designed manufacture throughput.

17. (Withdrawn) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increase brightness as claimed in claim 9, wherein said single-end fluorescent lamps are fixed by using said single-end fixing method, and wherein a method for arranging said fluorescent lamp tubes on said coating frame comprises:

selecting same type single-end fluorescent lamps or special fluorescent lamps; and

connecting and fixing said the single-end fluorescent lamps to a clipping mechanism on said coating frame;

arranging about 1-100 of said single-end fluorescent lamps on said coating frame, depending on the size of said coating frame and pitch thereof.

18-25. (Cancelled)

26. (Previously Presented) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the R of Ti(OR)4 is a hydrocarbon group, C_nH_{2n+1}, where n=1-5, and is selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, t-butyl, sec-butyl, and pentyl.

27. (Previously Presented) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the chelating agents are selected from the group consisting of Acetonacetate [$RC(O)CH_2C(O)R$], amino acid [$RCH(NH_2)COOH$], succinic acid [$HOOCCH(R)COOH$], and organic alcohol [$RC_6H_3(OCH_3)OH$].

28. (Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the amount of chelating agent and ~~/Ti(OR)~~$_4$ <u>Ti(OR)$_4$</u> has a molar ratio of 0.01-1.0 for the chelating agent.

29. (Previously Presented) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the aqueous solution is water based.

30. (Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the TiO_2-SCA gel is ~~$H_yTiO_{[(4-y)/2+y]}/H_xTiO_{[(3-x)/2+x]}$-SCA~~ $\underline{H_yTiO_{[(4-y)/2+y]}/H_xTiO_{[(3-x)/2+x]}\text{-SCA}}$ gel or $H_yTiO_{[(4-y)/2+y]}$ gel.

31. (Withdrawn – Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in ~~claim 2~~ claim 3, wherein the step of using ~~acid~~ alkaline process to prepare anatase TiO_2 sol and adjust the pH to ~~less than 2.5~~ greater than 7.0 comprises:

adding ~~inorganic acids such as HNO_3, HCl or HF, or adding organic salts such as CH_3COOH or RCOOH to make the pH less than 2.5~~ inorganic base NH_3 or NH_4OH, or organic base NR_3 or NR_4OH to make the pH greater than 7.

32. (Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim ~~3~~ 1, ~~wherein the step of using alkaline process to prepare anatase TiO_2 sol and adjust the pH to greater than 7.0 comprises:~~

~~adding inorganic alkali such as NH_3 or NH_4OH, or adding organic alkali such as NR_3 or R_4NOH, to make the pH greater than 7.~~

wherein the step of preparing semiconductor nano-crystalline anatase TiO_2 sol using said chelating agents in aqueous solution comprises:

adding H_4TiO_4 solution to a H_4TiO_4/ TiO_2 ratio of about 0-10 wt%, thereby improving thickness, adhesion, and hardness of said semiconductor nano-crystalline anatase TiO_2 sol coating.

33. (Currently Amended) A method for fabricating semiconductor nano-crystalline anatase TiO_2 sol, comprising:

preparing titanium alkoxide $Ti(OR)_4$ as a main component;

combining said titanium alkoxide $Ti(OR)_4$ with chelating agents, Eu or rare earth metal salt, and an aqueous solution to form a TiO_2-SCA gel;

peptizing said TiO_2-SCA gel by adjusting the pH value thereof; and

forming crystalline TiO_2 particles with the TiO_2 gel via a hydrothermal process.